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Tactical Wargaming After H–hour: An Unstructured Mental Process

A Monograph
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ABSTRACT

TACTICAL WARGAMING AFTER H-HOUR: AN UNSTRUCTURED MENTAL PROCESS by Major James M. Milano, USA, 49 pages.

This monograph investigates the suitability of the Wass de Czege Combat Power Model as a framework for thought in which the military decision-making process--specifically the critical steps of wargaming--can occur at the tactical level of war. The model can assist the decision-maker in understanding how to apply combat power, and it can further function as an analytical tool, especially in time-constrained situations.

The monograph first discusses the historical development of the estimate process, leading to what is currently used in the US Army today. Included in this is a discussion of when the concept of wargaming first appeared in doctrine and how the wargaming methodology evolved to its present format. A description of the military decision-making process in use today follows, with emphasis on its inadequacies in time-critical situations at the lower tactical levels of warfighting.

Next is a description of the recognition-primed decision-making theory developed by Gary A. Klein and associates and how this theory accurately delineates the process by which decision-makers, especially military leaders, make and assess decisions. Following this is an explanation of the Wass de Czege combat power model and its suitability as a framework for thought in which recognition-primed decision-making can occur. To demonstrate the utility of this method of thought and analysis, the combat power model is then applied to a tactical situation involving a battalion task force.

The monograph concludes that the US Army decision-making process is ideal for long-range planning and situations where time is not a critical factor. Recommended methods of wargaming described in our doctrine and instructional manuals require too much detail and are generally unable to accommodate rapid changes on the battlefield. Furthermore, they do not account for the largely intuitive nature of the process, particularly at the tactical level of warfighting. Training in the US Army, therefore, needs to focus on teaching leaders how to think, and not only what to think. Training efforts must produce an understanding of how to develop and apply overwhelming relative combat power at the right time and place. The Wass de Czege combat power model can supplement the current military decision-making process--especially wargaming--by teaching leaders how think about combat power, the decisive factor on the battlefield. The model provides structure to the leader's thought process in the form of a firmly ingrained mental framework that guides his thoughts and cues his mind.

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Weigh the situation, then move

-Sun Tzu, The Art of War

Introduction

Wargaming is one of the critical steps in the commander's estimate process. The objective of wargaming is a properly synchronized course of action that focuses and develops combat power at the critical time and place. Yet, the art of wargaming-- evaluation of alternatives or courses of action created to describe a way to accomplish a task--is not generally understood among those responsible for its conduct.[1] To function as a true analysis, the process should be detailed and thorough; most often, though, there is insufficient time to do it properly. This is particularly true at the lower tactical levels of warfighting, such as in the battalion task force, where "many staffs have rejected wargaming because they feel, or their experience shows, that it is too time-consuming."[2]

While the tactical decision-making process prescribed in the United States Army's principal source for doctrine covering staff organization and operations, FM 101-5, dated May 1984, is applicable to all unit levels, it is most suitable for higher organizational headquarters, such as divisions and corps. This is due mainly to the planning time usually available at these levels of command, as well as to the functions of the units.[3] The decision- making steps articulated in this manual are more suitable when time is not critical. However, the reality of the situation in the field--where these procedures are put to practice--is that the prescribed sequence of steps is not always practical due to the dynamic

nature of the situation. Sufficient time is usually not available to complete a thorough estimate, and abbreviated procedures for doing so are not standardized.[4]

Understanding how people make decisions, especially in situations where time is critical, is fundamental to understanding how decision-makers assess the decisions they make. Research conducted principally by the Army Research Institute in the area of tactical decision-making indicates that in time-critical situations, proficient decision-makers use their experience to recognize a situation as familiar. This gives them a sense of what goals are feasible, what cues are important, what to expect next, and what actions are typical in that situation. The ability to recognize the typical action means that experienced decision- makers do not need to do any concurrent deliberation about options. If everything seems reasonable they go ahead.[5]

Gary A. Klein calls this type of decision-making "recognition-primed decision-making." Key aspects of the situation enable a rapid reaction. Once a decision-maker identifies the typical reaction, there is usually a step of imagining what will happen if the action is carried out in this situation. If pitfalls are imagined, then the decision-maker will try to modify the action. If that is unsuitable, he discards the action for the next most typical action.[6]

Military decision-making is largely an intuitive process, particularly in time-critical situations. The lower the level of war at which decisions are made, the less available time in which to decide. For example, the time allocated to a battalion task force commander and his staff to perform the commander's estimate--mission analysis,

restated mission, development, analysis (wargaming), and decision on courses of action--and issue his commander's guidance is 30 minutes This is the standard at the National Training Center (NTC), where the US Army's most realistic brigade and battalion task force training currently takes place Thirty minutes for the commander's estimate is part of an overall objective of four hours for the entire task force planning process, to include order issue and backbrief [7] Clearly, with this much to do in relatively little time, the process can only be intuitive

Given the intuitiveness of the process, what is the framework of thought in which it takes place? What are the criteria by which a course of action is mentally created and analyzed? The answers to these questions are not found in our current warfighting doctrine. Many sources indicate that the decision-making process is a mental one A description, though, of a clear, well-defined framework for thought in which the process can and should occur is lacking

The purpose of this monograph is to investigate the Wass de Czege Combat Power Model as such a framework for thought in which the military decision-making process can mentally occur at task force level Huba Wass de Czege developed his combat power model "to provide a guide to 'how to think,' not necessarily 'what to think...'" The model can assist the decision-maker in understanding how to apply combat power, and it can further function as an analytical tool. It incorporates all of the variables traditionally considered to be important to decisions on the battlefield The primary purpose of the analytical framework is "to teach military judgement to US Army officers."[8] Most importantly, the model should not replace the current decision-making process. Rather, it should augment the current process, making decision-making more

effective, particularly when time to decide is critically short.

The monograph begins with a discussion of the historical development of the estimate process, leading to what is currently used in the US Army today. Included in this is a discussion of when the concept of wargaming first appeared in doctrine and how the wargaming methodology evolved to its present format. A description of the military decision-making process in use today follows, with emphasis on its inadequacies at the lower tactical levels of warfighting in time-critical situations.

The next section describes the recognition-primed decision-making theory developed by Gary A. Klein and associates and how this theory accurately describes the process by which decision- makers, especially military leaders, make and assess decisions. The theory has direct applicability to decisions made with little time for detailed planning and analysis.

Following this is an explanation of the Wass de Czege combat power model and its suitability as a framework for thought in which recognition-primed decision-making can occur. At the tactical level of war what matters most is developing and applying combat power at the right time and place, relative to that of the enemy. The combat power model is the developmental and analytical tool with which a combat leader can accomplish this, if his thought process is guided by knowledge and understanding of the effects of the dynamics of combat power.

To demonstrate the utility of this method of thought and analysis, I then develop a tactical situation in which I apply the combat power model. The tactical situation is a balanced battalion task force conducting an attack in zone to destroy enemy forces to enable its

brigade to continue the attack.

The monograph closes with conclusions about how the US Army can more adequately prepare itself for combat by better understanding how its lower tactical-level leaders execute the military decision-making process in time-compressed situations.

Historical Development of the Estimate Process

The general method and format of the estimate process have remained stable since its inception some eighty years ago. The methodology of considering all pertinent facts, generating courses of action and comparing them to arrive at a decision were all present in the first official description of the estimate in 1910. In development to their present format, though, the procedures involved in the process became increasingly detailed and, as a result, time-consuming. Understanding how and why the estimate process has evolved to what it is today may provide some clues regarding how the process can be updated to aid tactical decision-makers in performing the estimate tasks.[9]

The estimate process used today had its origins in the Prussian Army's attempt in the 1800's to develop a systematic, logical approach to solving military problems. The U.S. Army adopted the Prussian system at the Infantry and Cavalry School, Fort Leavenworth, at the turn of the century. Captain Roger S. Fitch of the U.S. Army Staff College first officially documented the "Estimate of the Situation" in his Estimating Tactical Situations and Publishing Field Orders, published in 1909. In 1910 the estimate of the situation became official U.S. Army doctrine.[10]

The first version of FM 101-5, published in 1932, described the procedures for performing the estimate of the situation as limited to considering the estimate steps as a "train of thought sequence." It was in the 1940 release of FM 101-5 that the basic five paragraph commander's estimate (i.e., mission, situation and courses of action, analysis, comparison, and decision) first appeared. These five paragraphs have remained the same throughout all subsequent versions except the 1977 unpublished draft, which considered the process to be more intuitive and less structured. The 1940 version considered the estimate to most commonly be a "mental process" at division level and below. This conclusion has been carried through every version since then.[11]

In 1960 the military decision-making process was described for the first time in FM 101-5. This formal process placed the commander's estimate within the broader context of all the command and staff actions required to develop and execute a course of action. The commander's estimate remained as one step (step 5) of the military decision-making process, which became an integral part of all subsequent issues of FM 101-5.[12]

The 1968 issue of the manual contained a more abstract and general way of looking at proper decision-making procedures. It considered battlefield decision-making in terms of a general problem-solving methodology that consisted of: 1) recognizing the problem; 2) gathering the data needed; 3) developing and listing possible solutions; 4) analyzing possible solutions; 5) selecting the best solution. "This 'new' science of decision making was emerging as a serious field of study and a generally accepted best way of solving problems." A discussion of this general procedure has been included in all subsequent releases of

the manual except the 1977 unpublished draft.[13]

The 1977 unpublished draft viewed the commander's estimate as a more dynamic, subjective, and hurried process than any version before or since. It emphasized the estimate as a "natural process," most of which took place within the mind of the commander. It viewed the structured steps in the commander's estimate and in the military decision-making process as fully applicable only when time was available. As a result, the entire estimate and decision processes were viewed primarily as training aids rather than for application on the battlefield.[14]

The 1982 manual reverted to the more objective, formalized approach to the estimate process that had characterized FM 101-5 before 1977. It firmly reestablished the formal estimate process as the best way to make decisions on the battlefield. It referred to military decision-making as "both an art and a science. How a commander or staff officer arrives at a decision is a matter of personal determination, however, sound conclusions, recommendations, and decisions result from a thorough, clear, unemotional analysis of all facts and assumptions relating to the situation."[15] The current, 1984 version made no significant changes in the estimate procedures or emphasis from that of 1982.[16]

Regarding wargaming itself, the 1932 version said nothing about how courses of action were to be analyzed. The next two versions (1940 and 1950) made superficial references to analysis, more along the lines of an "if, then" approach. It was not until the 1968 release of FM 101-5 that the term "wargaming" was first used. This version included a description of how it might be done and what it should produce. The described wargaming process was very detailed, breaking the proposed

course of action into segments, the commander visualizing the action in each and noting critical areas and incidents as well as advantages and disadvantages of the course of action. Eight products should result from each wargaming run. The whole process was time-consuming and intensive.[17]

The 1972 version of the manual made no significant changes to this wargaming methodology. The 1977 unpublished draft, however, placed emphasis on speed and a more informal and active style to wargaming, describing wargaming as "more of an art than a set of prescribed procedures."[18] It described no step-by-step method, nor was a numbered list of results presented. Most interesting was the example of wargaming presented requiring a decision under conditions of heavy contact with little available planning time. After mentally developing three possible courses of action, the commander and several of his staff discussed the advantages and disadvantages of each while standing around the situation map and quickly arrived at a decision. There was no wargaming *per se* in the example, but it provided a good illustration of rapid decision-making by defining and concentrating on critical factors. These included the status of the units involved, the current and possible future enemy situation, the situation on the flank, the ability to support with fires and logistically, and the time required to reinforce.[19]

The 1982 and 1984 versions of FM 101-5 returned to the descriptions of wargaming used in the 1968 and 1972 versions. With the exception of adding two more products to the wargaming process, almost the same words were used.[20]

The purpose of the estimate process is "to collect and analyze relevant information for developing within the time limits and available

information, the most effective solution to a problem." The May 1984 version of FM 101-5 further states that "the estimate is as thorough as time and circumstances permit," and that "details vary with the level and type of command." It allows that estimates may be written, but are usually a mental process, which "is true at division and lower levels."[21]

The Military Decision-Making Process Today

The military decision-making process used today consists of a series of sequential and parallel steps. These steps are performed by both staff officers and commanders, from mission receipt through mission accomplishment (see Appendix A, p. 38). The staff officer's part of the military decision-making process is to make recommendations and provide information to the commander enabling him to make intelligent, informed, sound decisions. The staff officer does this through his own estimate of the situation.

The commander's part of the process is to provide information and guidance to his staff and, most importantly, to make decisions. He does this by completing his own commander's estimate of the situation, which is "based on personal knowledge of the situation, on ethical considerations, and on staff estimates."[22]

The military decision-making process is, consequently, formal, structured, and time-consuming. It is analytical, uses a step-by-step approach, and makes few accommodations for decision-making in time-constrained situations. FM 71-2, The Tank and Mechanized Infantry Battalion Task Force, allows that "in time-critical situations, the commander may be forced to complete his estimate based on his personal

knowledge of the situation and issue oral orders to his subordinate units."[23] While recognizing that time restrictions may compress or abbreviate the military decision-making process, there is no recommended "how to" accompanying this recognition. The condition under which most military decisions are made is acknowledged, with little guidance about how to go about making these decisions.

Wargaming involves thinking systematically about a chain of events established by various courses of action. The fundamentals of professional judgement and knowledge are balanced against experience. Mental visualization of battle is the essence of wargaming. However, the guidance for the analysis and comparison paragraphs of the commander's estimate process is "vague and nonconclusive." Often it mentions factors for analysis and risk consideration, without identifying what factors or risks should be analyzed and considered, particularly under time-critical situations. The estimate process is ideal for long-range planning and situations where time is not a critical factor. However, the recommended methods of wargaming require too much detail as part of decision-making for a time-critical situation.[24]

Our doctrine does not describe a mental wargaming process--a framework for thought--for use in combat when decisions must be made in relatively short periods of time. FM 71-2 states that "routinely, the task force will have limited time to plan and prepare to conduct an operation.... The commander does a rapid estimate with the other members of the tactical CP [command post]." Additionally, "...at task force level, wargaming is a mental process of visualizing each step of the battle, considering task force actions, enemy reactions, and task force counteractions."[25] A set of criteria against which the commander

considers the developed course of action is lacking. These criteria, to have utility throughout the force, must be familiar, universal, and they must relate to what is of true importance in combat.

ST 100-9, Techniques and Procedures for Tactical Decisionmaking, July 1991, published by the U.S. Army Command and General Staff College, though not official doctrine, is used for CGSC instruction in brigade, division, and corps operations. Used to teach the military decision-making process, it devotes an entire chapter to wargaming. ST 100-9 states that wargaming may be a mental process at the lower tactical levels, particularly when time to wargame is short. The process is one of action-reaction-counteraction. Among the general rules ST 100-9 provides for the wargamer to observe is to "continually assess the feasibility of the course of action to see if it meets the requirements of the mission. If the course of action fails to remain feasible at any time during the war game, stop the war game, and reject the course of action without further analysis."[26]

ST 100-9 describes three methods for wargaming a course of action: the avenue in-depth technique; the belt technique; and, the box technique. Each technique simply organizes the area to be analyzed. Critical events and decision points identified within each technique focus the wargaming participants. These critical events and decision points are "normally those specified or implied tasks the completion of which are essential to mission accomplishment and which, in the judgement of the wargamer, require detailed analysis."[27] Absent is a description of within what framework this analysis is to occur. In other words, answers to questions about how the wargamer is to assess each course of action for feasibility, and by what criteria the wargamer is to judge,

are not addressed. The answers to these questions form the critical missing piece to U.S. Army doctrine regarding course of action analysis.

Current procedures described in U.S. Army doctrine for completing the estimate process do not match the conditions of the modern battlefield. There is a discrepancy between how the estimate process is actually done and the guidance indicating how it should be done. Most task force-level staffs are unable to complete the estimate process or an abbreviated form of the process, and most often this is due to a lack of time. Often a single course of action is developed, and while this is acceptable under time constraints, the course of action is not sufficiently analyzed for feasibility.[28]

This discrepancy becomes apparent upon analysis of take-home packets of units that have recently conducted training at the NTC. Comments such as "the battle staff conducted a hasty planning process and only fully developed a single COA [course of action]...The war gaming process was not an integrated effort to ensure that all combat power would be synchronized at the critical point/time of the battle...;" "the task force estimate process requires great improvement;" and, "the planning process was characterized by a lack of discipline and focus" are indicative of many of the comments found in a majority of the take-home packets. Further analysis of take-home packets by William F. Crain in his MMAS thesis revealed that task force-level staffs were unable to modify the decision-making process to provide critical, timely information. What information was provided to the commander was frequently inadequate or inaccurate.[29]

The above comments are substantiated by the following statement from a recently published NTC document entitled Orders Guide. It states

"when enough time is not available, the command estimate sequence of events in ST 100-9...is often ignored or abridged by brigades and battalions."[30] As a solution the document offers an abbreviated command estimate process for use in time-critical situations, more of which will be described later in this paper.

Personnel at the Army Research Institute have extensively studied the estimate process and its utility in time-constrained situations. Their research leads them to question whether the estimate process as currently defined is being followed in the field.[31] They have determined there is usually insufficient time in which to perform the process correctly, abbreviated procedures for performing the process are not standardized, and that there is little confirmed basis for battle outcome predictions in the analysis step.[32] Thomas J. Schwartz reached a similar conclusion in his thesis, entitled "A Theory and Model for the Planning of Land Combat," in which he states that the command estimate process as outlined in ST 100-9 enables the user to compute a force ratio for combat, but it provides no estimate of the chance of successful battle outcome.[33]

Dr. Rex Michel, in a paper for the Army Research Institute, states that effective modern battlefield decision-makers must quickly eliminate infeasible alternatives, select one, and develop it sufficiently to convey the essential actions and intent to subordinates with sufficient time for them to plan and execute. He calls this process the manifestation of tactical decision-making expertise, included in which is effective course of action analysis, or wargaming. The essence of this expertise, and the criteria with which it can be developed and applied, will be examined in the next section.[34]

Recognition-primed Decision-making

> Decision-making is a process requiring two distinct skills. The commander must be a master of both. First, he must have the intuitive skills to recognize and analyze the essence of a given problem. Second, he must have the creative ability to devise a practical solution to it.[35]

Understanding how people in positions of responsibility make decisions is vital to developing ways to improve the process. Gary A. Klein's Recognition-Primed Decision-making (RPD) model describes the use of experience by the decision-maker to recognize a situation as familiar, to sense what goals are feasible, what cues are important, what to expect next, and what actions are typical in a situation (see Appendix B, p. 39). The skill and experience of the decision-maker enable generation of only plausible options so that computing advantages and disadvantages need not be considered. By relying on intuition and a recognitional, pattern-matching process that flows from experience, the process of "satisficing," which involves searching for the option that works and not necessarily for the best option, occurs.[36]

Satisficing, as opposed to optimization, occurs when the decision-maker chooses the first acceptable alternative that satisfies the goal, rather than the best alternative. Optimization involves selecting the "best" alternative, after repeated re-examination of several. A lack of time for optimal decision-making may lead to satisficing.[37]

Recognitional decision-making can be contrasted with other forms

of analysis to see clearly the benefit of this approach, especially in time-restricted situations. Multi-attribute Utility Analysis, which is essentially what FM 101-5 and ST 100-9 advise decision-makers to use, involves deliberating about several options concurrently before making a decision. This, and another method called Decision Analysis, which estimates the probability and utility of each possible future outcome in terms of maximum and minimum outcomes, do not work under time pressure because they take too long to complete.[38] Recognitional decision-making, conversely, makes available to the decision-maker a course of action at every point in the process. The decision-maker begins with an initial option, and if time allows some evaluation, the option will be examined, accepted, improved, or rejected for a second option which then becomes primed for implementation.[39]

In addition to its usefulness in time-critical situations, there are other advantages of recognition-primed decision-making compared to analytical decision-making. First, with RPD a good option is generated as the first one considered versus generating several options in a semi-random process. Second, situation assessment and understanding are essential in RPD, versus emphasis on selecting among options as opposed to recognizing situations. Third, the RPD model assumes decision-makers evaluate actions by imagining how they will be carried out; this allows for improvement, if necessary. Analytical methods emphasize evaluation of several options, and any changes require the evaluation to begin again.[40]

To demonstrate how RPD can also function when there is time available to make a decision, Klein has developed three different levels of recognition-primed decision-making (see appendix B). The first is

Automatic RPD, which involves the decision-maker using knowledge and cues to recognize a situation as familiar or typical. This "automatic" recognition includes with it a recognition of what goals can be achieved, what cues to monitor, and other types of expectations.

Verified RPD is the next level. Here the decision-maker again recognizes the typicality of the situation, but has the time to evaluate the option, perhaps to imagine it being implemented. No other options are considered, even though they exist in an action queue of options varying in their availability. The implementation of the typical option is not automatic.

Serial RPD, the third level, describes a scenario in which the favored option may be implemented, or it may be modified to fit the needs of the current situation. In some cases it is rejected and the next most typical option is selected from the action queue. A series of options is considered, but there is never a comparison of the merits of one option versus another.

Common to all three levels is that the decision-making begins with pattern recognition. The decision-maker uses all the experience (i.e., cues and knowledge) gleaned from years of practice to view an event as typical in some way. The recognition makes it obvious what can be accomplished, what dangers exist, what critical cues must be monitored, and what expectations to form. Of course, pattern recognition carries with it a "typical" set of reactions, and the most typical is considered first. This is quite efficient, since in most cases the most typical reaction will be the one called for. Sometimes, the decision-maker may attempt to verify this option by evaluating the conditions and the plausibility of successfully carrying it out.[41]

This model differs from the other analytical models mentioned previously in that the latter focus on the options and ignore the predecision processes. "They are prescriptive models for applying the most powerful methods for evaluating a set of options. They are not designed to handle strategies such as growing a better option by modifying one that is almost adequate."[42] This is analagous to the often-heard expression "a 70% solution now is better than a 90% solution later."

The RPD model assumes that an acceptable course of action may be chosen without conscious generation and evaluation of alternatives. The emphasis is on situational awareness, which is similar to the concept of *coup d'oeil*, described by Clausewitz as "the quick recognition of a truth that the mind would ordinarily miss or would perceive only after long study and reflection."[43] Situational awareness and understanding require a framework for thought, a set of criteria useful in all situations that better enables and more quickly allows this understanding to be achieved.

Battlefield vision, or intuition, is an explainable ability that leaders can develop. To be effective, leaders must "see" the battlefield. They must be able to visualize how events will unfold as battle progresses. This ability comes from experience as well as from studying and understanding the many situations in which one may need to make decisions. Leaders with intuition, with *coup d'oeil*, are experts in a particular field of knowledge. Mastering warfighting knowledge makes intuition and battlefield vision possible.[44]

According to one particular theory of "expert" decision-making, the expert has lumped together the characteristics of past decision problems

with the actions or options that prove effective. Rather than go through a series of formal steps he can go directly from the problem characteristics to the solution. Novices and experts will show different patterns of information use in their decision-making. Experience is the critical difference between the novice and the expert decision-maker.[45]

Klein suggests that expert performance is based on reasoning by analogy rather than by analyzing and reintegrating components, as novices do. Experts do not follow specific rules. Expertise is grounded in the ability to see the problem in terms of an analagous situation, appreciation of the significance of the variables, and anticipation of what needs to occur to achieve a goal.[46]

In combat, commanders with a large, well-organized body of warfighting knowledge will use pattern recognition--matching available information with what already exists in memory--quickly. Too many commanders have failed because they have blindly applied methods which were inadequate in a new situation, though they may have worked in the past.[47] Instead of consciously reasoning through several analytical steps, the expert warfighter will quickly recognize the pattern of events unfolding on the battlefield as familiar. If the situation is not immediately recognizable, then he acquires more information. Based on the process of matching information with memory, the expert warfighter then forms expectations about future events and directs the application of superior combat power at the critical time and place on the battlefield.[48]

Recognitional decision-making is more important when experienced personnel are working under time pressure to find the first option that looks as though it will work. It is useful for cohesive teams that are not

deadlocked by conflict, therefore, training in this method is essential Experienced decision-makers cope well with time pressure and dynamic conditions. Rather than trying to change the way they think, the aim should be to help them think better Analytical decision-making forces the commander to make a choice rather than working with the team to modify and improve options.[49]

In experiments conducted by Army Research Institute using experienced US Army decision-makers, planners consistently used recognition-primed decision-making by finding options that could potentially satisfy the requirements of the situation and "playing out" the option in their minds or on a map. They did not concurrently deliberate options even though Army doctrine suggests it should be done. These decision-makers, operating under various levels of time pressure and stress, did not follow the classical decision-making process. They consistently approached the decision-making process by addressing one single option at a time.[50]

There is too much reliance today on perfect intelligence, accurate information flow, great deliberations about operations, and written, complete orders. Once the situation has changed, there is a point at which the commander has the minimum essential information to decide on a course of action. Beyond this point starts the quest for certainty. "A situation requiring the most immediate measures right now will not get more advantageous as time progresses and intelligence firms up."[51]

This is where the Huba Wass de Czege Combat Power Model can serve as a framework for thought to develop and analyze a course of action based on an understanding of a given situation Essential at all levels of war is the application of overwhelming combat power at the

right time and place on the battlefield, always relative to the enemy's combat power. The combat power model can not only assist the decision-maker in understanding how to apply combat power; it can function as an analytical tool as well. The deficiency in our doctrine, specifically in FM 101-5, is that relative combat power is dealt with only in general terms. There is no integrated method which guides quantitative or qualitative analysis of combat power.[52]

The Wass de Czege Combat Power Model

> Combat Power is always relative, never an absolute, and has meaning as it compares to that of the enemy.[53]

The Combat Power model developed by Huba Wass de Czege is an analytical framework that helps portray the relationship between actions and the ends of those actions in the maximization of relative combat power. It helps ensure the "building blocks" to the structure of combat power are in place.[54]

Wass de Czege believes that in some cases the analysis of combat power "has become a cliche-ridden exercise. In other [cases] there is a tendency to attribute more to the results of wargames and computer assisted simulations than they warrant simply because they are cloaked in an aura of scientific legitimacy."[55]

According to Wass de Czege, "tactical analysis as it is practiced today lacks a rigorous methodology and language." Furthermore, he sees it as often "limited to a mechanical selection of a main attack force, the objectives of main and supporting attacks, and the routes to those

objectives based on a few simple decision rules." He believes that many factors are left out of the analysis and many courses of action can often be equally well supported by such rules. Wass de Czege does not see the use of his model as a method of analysis replacing the military decision-making process or the current wargaming methodology. Rather, it should supplement these processes to provide better understanding of the essential consideration in warfighting: developing and applying combat power.

FM 100-5 states that the dynamics of combat power--Firepower, Maneuver, Protection, and Leadership--decide the outcome of campaigns, major operations, battles, and engagements. Additionally, the manual defines combat power as "the ability to fight. It measures the effect created by combining maneuver, firepower, protection, and leadership in combat actions against an enemy in war." It is the leader's duty to combine these dynamic capabilities "in countless combinations appropriate to the situation..."[56]

The Wass de Czege model analyzes the dynamics of combat power and their effects as they relate to the development and application of combat power in determining the outcome of battle. The model is expressed as an equation as follows:

$$L_f(F_f + M_f + P_f - D_e) - L_e(F_e + M_e + P_e - D_f) = \text{The Outcome of Battle,}$$

where L_f, M_f..L_e, etc are friendly (f) and enemy (e) Leadership, Maneuver, Firepower, and Protection effects. D_e is the enemy degradation of friendly firepower, maneuver and protection effects, and D_f is the friendly degradation of the effects of the enemy's firepower, maneuver,

and protection.

In simple terms, the equation states that the outcome of battle depends on the difference in combat power of the antagonists. Further, it is the effects of firepower, manuever, leadership, and protection that determine this outcome, not merely the application of these dynamics. The effects are relative to those of the enemy, whose effects must be minimized. It is not an equation solvable by computers in order to determine the outcome of a potential battle situation. "Many of the variable aspects of the terms remain unknown until the moment of their impact on the battlefield decision."[57]

The firepower effect is dependent on a complex set of variables: the volume of munitions, the lethality of each munition, the accuracy of the delivery means, target acquisition capability, and the flexibility of employment of the delivery systems. Each of these is further a function of several more variables.

At the tactical level, the maneuver effect is the abil ty to engage the enemy or avoid engagement in such a way as to maximize the effects of friendly firepower and minimize the effects of enemy firepower. Through maneuver the commander attempts to alter the firepower balance in his favor.

The protection effect is shielding or preserving the fighting potential of the force. The enemy's firepower and maneuver effects must be countered by making soldiers, systems, and units difficult to locate, to strike, or to destroy. Additionally, units must be protected from non-combat causes, such as the environment.

Wass de Czege considers the leadership effect to be the most important, yet least understood element of combat power. "Leadership

is the element, which when combined with the effects of firepower, maneuver, and protection, becomes combat power."[58] In order for the leader to have impact on the development and application of combat power, he must possess certain abilities and qualities appropriate to his level. He must be technically proficient and have a thorough understanding of the full range of his own unit's capabilities and those of units which support him. He must be dedicated to his profession and committed to accomplishing his assigned tasks. He must be able to transmit commitment, dedication, and a sense of mission to his subordinates. He must possess certain communicative skills that allow him to provide understandable instructions as well as receive the information he needs to make effective decisions. He must have a feeling for the effects of combat on himself, his soldiers, and the impact these may have on the execution of his assigned mission. Finally, he must possess judgement and certain appropriate analytical skills.

Huba Wass de Czege developed his combat power model to three levels of abstraction, each of which is determined by a set of variables that constitute the next level of abstraction (see Appendix C, p 40). In the model, the four basic variables constitute the first level of abstraction. They are determined by a set of 18 more specific variables, and these constitute the second level of abstraction. These 18 variables are further determined by approximately 64 more specific variables which then constitute the third level of abstraction.[59]

The utility of the model is that a commander or staff officer of a particular unit, such as a battalion task force, if he were using this method of analysis, could go to additional levels of abstraction to examine his situation and decide on a course of action. This would be

done to identify all of the variables over which he had control, and then to examine these variables in terms of his ability to affect them. The leader would then decide on a course of action which in his judgement maximizes his combat power for that particular situation. Given the appropriate experience, this is the thought process, or framework for thought, which a leader might intuitively follow.

The combat power model develops a realization of the estimate of relative combat power, and it includes an analysis of many of the intangible factors that impact on the wargaming process.[60] Additionally, it can serve as a framework for thought for the development of a single course of action when time is critical, and as an analytical tool for one or more courses of action when planning time allows for their development. By functioning as a "decision architecture" when rapid decisions are required during war, it is an alternative to the command estimate process described in FM 101-5. It is a logical scheme for war planning and warfighting. It can lead the commander and staff to consider only the most plausible courses of action and contingencies.[61]

The model is not a quick-decision gimmick that can be pulled out of a leader's hip pocket to serve as the solution to all of his problems on the battlefield. Rather, the analytical framework is useful more in learning about combat and understanding its dynamics. It provides structure for a leader's thoughts and guides his thinking in developing and analyzing the solution to battlefield situations. In essence, "it is designed to assist the leader (or his staff officers) in asking the right questions about what to do to win."[62] With more time for analysis, the leader can further develop the model according to his situation. Less planning time will require the leader to focus on one or more essential,

mission-enabling events for analysis.

The next section will show how a leader would use this model for course of action development and analysis. The intuitive examination of the variables over which he has control coincides with the concept of Recognition-Primed Decision-making developed by Klein. By understanding the situation in terms of the dynamics of combat power, the leader, with the assistance of his staff, can devise a plan that maximizes and applies combat power at the right time and place, relative to that of the enemy.

The Combat Power Model Applied to a Tactical Situation

A balanced battalion task force, TF 1-2, consisting of two armor companies (M1), two mechanized infantry companies (M2), an anti-armor company (M901), mortar and scout platoons (M106 and M3), a combat engineer company, priority of fires from a direct support artillery battalion (155mm SP), and a stinger platoon attacks in zone to destroy enemy forces. Additionally, it must secure a phase line to enable its parent brigade to continue the attack to secure a subsequent terrain-oriented objective.

The task force faces a motorized rifle battalion (MRB) (-), consisting of two motorized rifle companies (BMP-2) and one tank company (T-72) occupying a partially-prepared defense (in position up to 24 hours).

Since the attack begins 12 hours after he receives his mission, the task force commander has four hours to complete his planning, issue his order, and receive brief-backs from his subordinate commanders and

support leadership. The commander uses the abbreviated command estimate process as described in Orders Guide, a National Training Center publication (see Appendix D, p. 42). According to this publication, "the abbreviated estimate process is designed to be used by commanders when time is not available to complete the full command estimate sequence.... [It] cuts out the formal briefing procedures and focuses the commander and staff on the essential tasks that must be accomplished." Important aspects of this process are that the commander must decide the course of action early, and that the staff implements the commander's decision rather than developing alternate courses of action to consider.[63]

The task force commander, along with his S3 (operations officer) and his S2 (intelligence officer), received the order at the Brigade tactical command post. The brigade order was in the format of a graphic-matrix order, which consisted of both graphics (in the form of an overlay) and a matrix-type order (fill-in-the-blank matrix formats that assist planners in quickly writing down the essential elements of the order).[64]

On the way to his tactical operations center (TOC) after the brigade orders briefing, the task force commander, his S2, and his S3 discuss the upcoming mission. He contacts his executive officer by radio and has him, along with the task force fire support officer and engineer, meet him at the TOC. Once all the key personnel are assembled, they and the commander gather around a map to analyze the mission, weigh the friendly and enemy situations, discuss the operation, and quickly determine one or two possible courses of action. Each staff officer provides the commander information regarding his area of expertise,

information pertinent to the situation that will assist the commander in making his decision.

The commander and staff then wargame the possibilities and analyze each for advantages and disadvantages, all within the framework of the combat power model. Following the wargame, the commander, based on his knowledge and understanding of the situation, on his own experience and judgement, and on the input from his staff, decides on a concept of operation and issues his guidance. This entire process takes approximately 30 minutes, in accordance with the battalion planning time schedule of four hours.[65] The staff officers use the commander's planning guidance and initial concept of the operation to further develop the task force plan. They implement the commander's decision rather than develop alternative courses of action. The next few pages describe how the commander and staff use the combat power model to wargame and decide on a concept of operation.

The commander knows from experience as well as from his training that unless the task force direct and indirect fires are massed, and the units firing within mutual support of one another, the effect of his firepower on the enemy will be minimal. Target acquisition is one of the principal determinants of the firepower effect. It, in turn, is a function of intelligence and analysis, location and functioning, and transmission of target data. The task force S-2, based on intelligence received from brigade and his understanding of how the enemy fights, has a general idea of how the enemy will doctrinally deploy itself. The suspected enemy situation, however, must be confirmed so that combat power can be developed and massed to destroy as much of the enemy MRB(-) both before and during the upcoming mission.

At task force level, this confirmation will come largely from human sources, specifically, from reconnaissance forces. These forces, principally the task force scouts, must penetrate the enemy security and defensive zones and get to observation posts from which they can observe and report enemy activity and unit locations. The commander needs to determine how to get these assets into the enemy zone. This will involve fighting the enemy to defeat his security zone forces, and then dismounting the scouts to infiltrate deep into the enemy sector. In this situation, the commander's concept of operation includes a counter-reconnaissance fight to destroy a portion of the enemy security forces, thus enabling the task force scouts to infiltrate to acquire information specified by the task force S-2.

The reconnaissance effort will also effect the accuracy of fires, one of the other principal determinants of the firepower effect. Confirmation of the S-2's enemy situation template, and location and reporting of enemy assets will greatly improve the accuracy of fires, particularly indirect fires. Moreover, knowing the location of key enemy units and systems will enable the task force commander to mass fires on these targets, which enhances the lethality of the munitions and volume of fire. Specific reconnaissance objectives are the motorized rifle battalion commander's counterattack force, which is probably his tank company, the mortar battery, and the anti-tank platoon. The commander considers these assets to pose the greatest threat to the task force once the attack begins.

Lethality of munitions is another principal determinant of the firepower effect. According to the model, lethality of munitions is a function of design characteristics and explosive energy. The task force

commander has little influence on these factors. In addition to these two, however, the lethality of munitions may also be determined by the types of engagement techniques and sequences the commander employs, the use of obstacles to impede the enemy's mobility, and the range at which enemy systems are engaged. The commander's concept of operation, based on recommendations from the S-3 and the S-2, specifies overwatch positions for the anti- armor company (M901) and the GSR section. The commander tells the task force fire support officer to plan two FASCAM targets, based on the S-2's recommendation, one to hinder the withdrawal of one enemy company from the main defensive zone and the other to impede the commitment of the enemy counterattack force.

Regarding the maneuver effect of combat power, combat assets must be employed to maximize their capabilities and effects on the enemy. Since Task Force 1-2 is attacking, the commander and S-3 identify terrain from which the anti-armor company can overwatch advancing units and cover likely counterattack avenues into the flank and rear of the force as it advances. The speed of the task force combat systems, principally the M1A1 tank and the M2 Bradley fighting vehicle, will allow the commander to attack quickly and violently, firing on the move, shocking and overwhelming the enemy. In analyzing the terrain over which the task force must attack, the commander identifies where he wants his armor to attack, and where he can best employ his infantry forces. Two defiles, dominated by high ground on each side, must be cleared of enemy before the task force can safely advance. The commander designates this terrain as objectives for an infantry company to seize.

The maneuver effect is a function of management of resources, of

which the use of personnel is a principal determinant. Use of personnel is critical in terms of knowing and understanding the people in the unit. Since the task force scouts must advance to a position where they can then dismount and infiltrate, combat power must be used to ensure they survive to the dismount point. The task force leader assigns to company team Alpha the counter-reconnaissance mission of conducting a movement to contact to a designated phase line (scout dismount point) to destroy enemy security forces in zone. Additional combat power, including a mortar section, an engineer platoon, and a Stinger section, are attached to the company team. The task force commander assigns Team Alpha this mission because the Alpha company commander is the most experienced and most mature. Additionally, since this particular mission will occur at night to take advantage of the task force's relatively superior night-fighting abilities, the commander chooses Alpha company because it is the best night-fighting unit in the task force.

The protection effect relates directly to survivability on the way to and on the battlefield. Its key determinants are concealment, exposure limitation, and damage limitation. Concealment applies to personnel, equipment, and the unit. The task force commander examines the terrain throughout the zone for the most covered and concealed routes and axes. These routes and axis must not only provide cover and concealment; they must also afford access to the key terrain that dominates and controls them. This is essential for ensuring mutual support between elements of the task force as they attack. Otherwise, they will be subject to piecemeal defeat by the enemy. Furthermore, the terrain over which the commander decides to attack enables the task force to maneuver rapidly,

taking advantage of the superior mobility and speed of the combat systems.

The task force S-4 informs the commander that the mortar platoon is critically short smoke rounds with which the commander planned to screen along his southern flank, as well as deceive the enemy as to the direction of his attack. Furthermore, it is unlikely resupply will occur before the start of the attack. These deficiencies will have an impact on the commander's ability to protect the task force, since protection depends principally on concealment, which is a function of camouflage, stealth, and countering enemy intelligence and acquisition means. Furthermore, smoke assists in limiting the exposure of task force elements to enemy direct fire systems. The commander directs the S-3 to request from the brigade S-3 operational control of a smoke generating platoon in direct support to the brigade. This will augment the task force smoke-generating capability.

Exposure limitation is another determinant of the protection effect, and it, too, applies to personnel, equipment and the unit. Movement techniques, use of overwatching and covering terrain, and the speed with which the task force attacks all enhance exposure limitation. The task force commander indicates attack-by-fire and overwatch positions, which unit is to occupy them, what is the orientation of fire, which units are being supported, and other essential instructions. He analyzes likely enemy counterattack routes, directing how and with what forces they will be observed and blocked.

Deception planning is critical to the task force success. The commander and the S-2 analyze where the enemy commander thinks they will attack and how the enemy commander will attempt to destroy the

task force. Once they determine this, the commander and the staff decide how to convince the enemy commander that is indeed what they are doing while, in fact, doing something different. The commander wants to hit the enemy commander's weakness with all available strength, while at the same time leading him to believe that the task force is doing what is expected. The commander determines that the counter-reconnaissance mission assigned to Team Alpha offers the best opportunity for deceiving the enemy commander. He, therefore, directs the S-3 to specify to the Team Alpha commander that he is to attack on broad axis to destroy two suspected enemy combat outposts. This will prevent any immediate repositioning of either enemy company or battalion counterattack forces, as the enemy commander will be unsure of the direction of the task force attack. The S-3 attaches an additional mechanized infantry platoon to Team Alpha, providing it additional combat power to accomplish this mission

The leadership effect is, as previously stated, the most important element of combat power. It is the leader's ability at combining the firepower, maneuver, and protection effects that is essential and must be developed. "Given the same parameters, good leaders can generate many times more combat power than mediocre ones."[66] The task force commander's abilities are determined largely by his training and experience, and by his understanding of the situation confronting him. By thinking in terms of the combat power model and the effects it describes, the relationship between task force actions and the ends of those actions, all in the interest of maximizing relative combat power, will become clear.[67] The commander must, therefore, be able to visualize the action from start to finish, recognize critical actions, and

ensure combat power is massed in each of these critical events

Conclusions

> The commander always has a concept in mind for the employment of his unit. The more he knows, the more he develops the concept. When he is given a mission (or a new mission), as the situation shapes up, he refines his picture.... He knows what he has to do and, conceptually or in detail, how his unit will do it.[68]

The military decision-making process relies on following a set of highly structured procedures and rules. As a result, it fails to accommodate how expert decision-makers represent situations in their minds and their overall approach to problems. Without this knowledge, this process is often stilted and formal. It actually slows down and inhibits decision-making and results in poor acceptance among those required to implement it.[69] Furthermore, the process is unsuitable in time-critical situations, especially at the lower tactical levels. Here the process, especially analysis, is largely mental, requiring quick decisions in a dynamic situation.

The US Army decision-making process is ideal for long-range planning and situations where time is not a critical factor. Furthermore, the recommended methods of wargaming described in our doctrine and instructional manuals require too much detail on the part of the decision-maker for a time-critical situation.[70] They are unable to accommodate rapid changes on the battlefield and do not account for the largely intuitive nature of the process, particularly at the tactical level of warfighting.

In general, the military decision-making process and, in particular, the wargaming steps are rational means of making a decision. The decision the entire process produces is a product of purely deductive reasoning. Consequently, it can be taught and described, and it leaves an "audit trail" by which the final decision can be justified. This enhances its instructional value and reinforces a scientific approach to warfare.[71] While this may be suitable for the classroom or in situations where time is not critical, it hardly accounts for the realities of decision-making in time-critical situations.

Training in the US Army needs to focus on teaching leaders, especially those at lower tactical levels, how to think, not only what to think. Just as a boxer, for example, enters the ring with an idea of what punches to throw and what measures he can take to counter his opponent's punches, he must first be trained in thinking about how he will punch, counter-punch, and block or evade an opponent's punches. This is accomplished with good coaching, lots of sparring, and a great deal of work. If the boxer waits until he steps into the ring to start thinking about how he will fight, he will lose. His framework of thought--the basics of boxing--must be firmly understood long before he fights. The more he fights, the more experienced he becomes. He makes adjustments to his style based on his experience and whom he is fighting.

At the tactical level of war, training efforts must focus on understanding how to develop and apply overwhelming relative combat power at the right time and place. Fundamental to this is knowing how to maximize the effects of friendly firepower, maneuver, protection, and leadership, while at the same time minimizing the effects of the enemy's.

Deciding what must be done needs to be considered within an all-encompassing mental framework. There must be structure to the thought process, if nothing else than because of the fast-paced, dynamic nature of the battlefield in which friction weighs heavily. In practice, US Army officers often either rely on intuition and experience to place values on factors contributing to the combat power of opposing sides, or they engage in a deceptively simple counting exercise in which they count things--direct fire weapons, maneuver units, and supporting artillery tubes.

The problem with the first method, the "gut feeling" approach, is that a wide range of possible conclusions can flow from such loosely structured and unscientific analysis. This may work in a less complex and slower paced environment, but today's battlefield is lethal, fast-paced, and violent.

The second method--counting--attempts to be more objective and scientific. The problem with this type of analysis is that it can lead to simplistic and fatalistic thinking based on judgements about only the quantifiable aspects of the battlefield without accounting for the often predominating intangible factors of warfighting, such as surprise, initiative, and morale.[72]

The Wass de Czege combat power model can supplement the current military decision-making process by teaching leaders how to think about combat power, the decisive factor on the battlefield. They must understand the effects of maneuver, firepower, protection, and leadership, and how to apply these dynamics to achieve maximum results. There must be structure to the leader's thought process, a firmly ingrained mental framework that guides his thoughts and cues his mind.

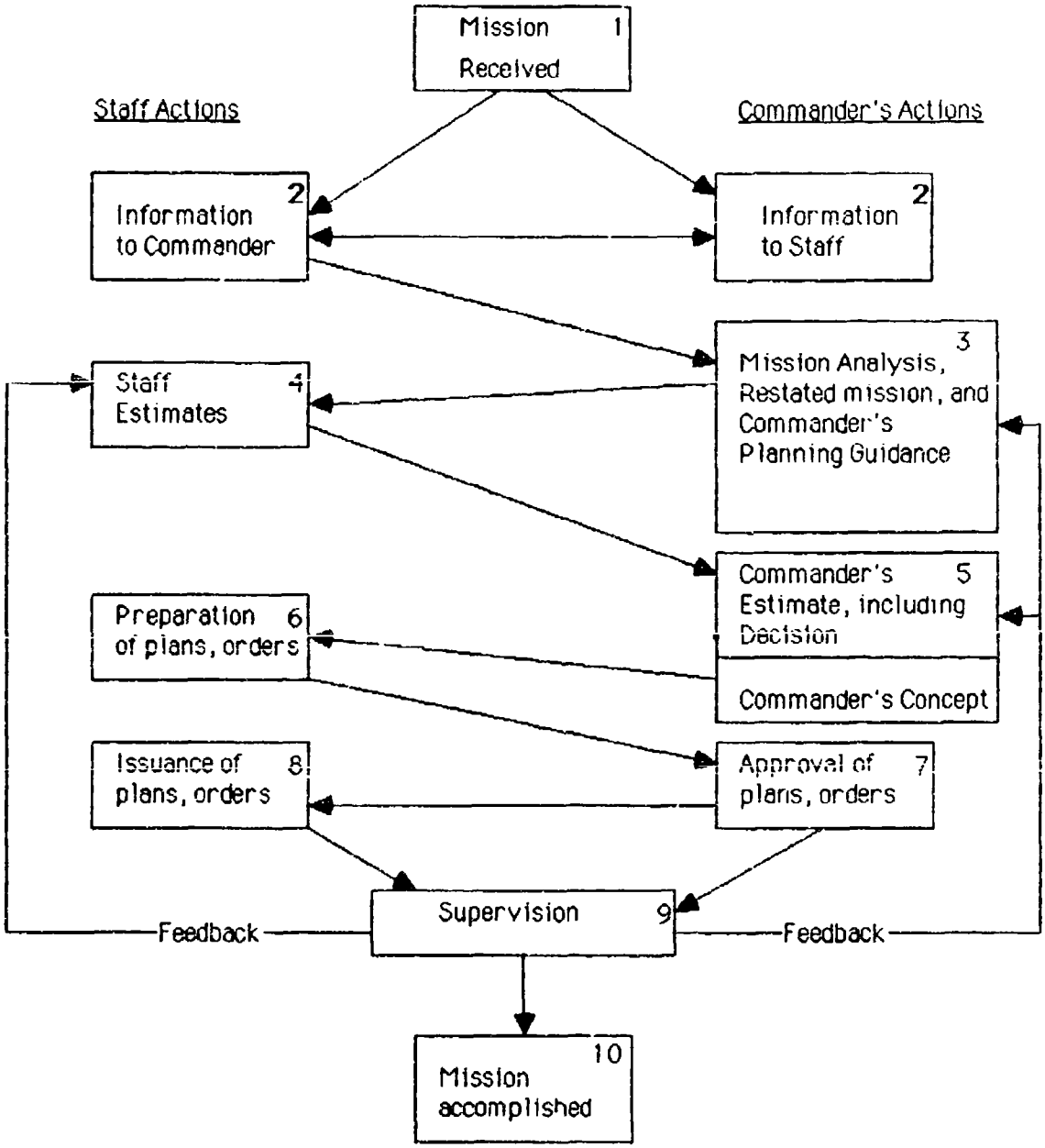
The training process should begin by using the Wass de Czege combat power model as a framework for thought with which we educate and train our leaders to understand the dynamics of combat power. Next, by integrating this framework with what we know about how leaders make decisions in time-critical situations, which are those encountered most often at the lower tactical levels, we can improve tactical decision-making and analysis. Leaders can be trained to think and operate effectively under less than ideal conditions. They do not need to be taught shortcuts to the process. Rather, they must learn how to compress the process and still make tactically sound decisions. "For by teaching the [leader] to organize his intake of sensations, to reduce the events of combat to as few and as easily recognizable a set of elements as possible..., one is helping him to avert the onset of fear or, worse, of panic and to perceive a face of battle which, if not familiar, and certainly not friendly, need not, in the event, prove wholly petrifying."[73]

Individual experience plays a central role in governing how we react to a particular situation. By broadening the experience base of our leaders we will improve their recognitional abilities in decision-making situations. This can be done with education in the fundamentals of warfighting, and with training. Training that emphasizes generating and evaluating sets of options may be counterproductive; in fact, it may reduce the credibility of the training program.[74] Training can be more productive by focusing on situation assessment, and letting trainees improve their recognitional abilities.[75]

Once a leader decides what must be done, a framework of thought that focuses on the instinctive development and application of combat power will enhance the wargaming process, a critical aspect of military

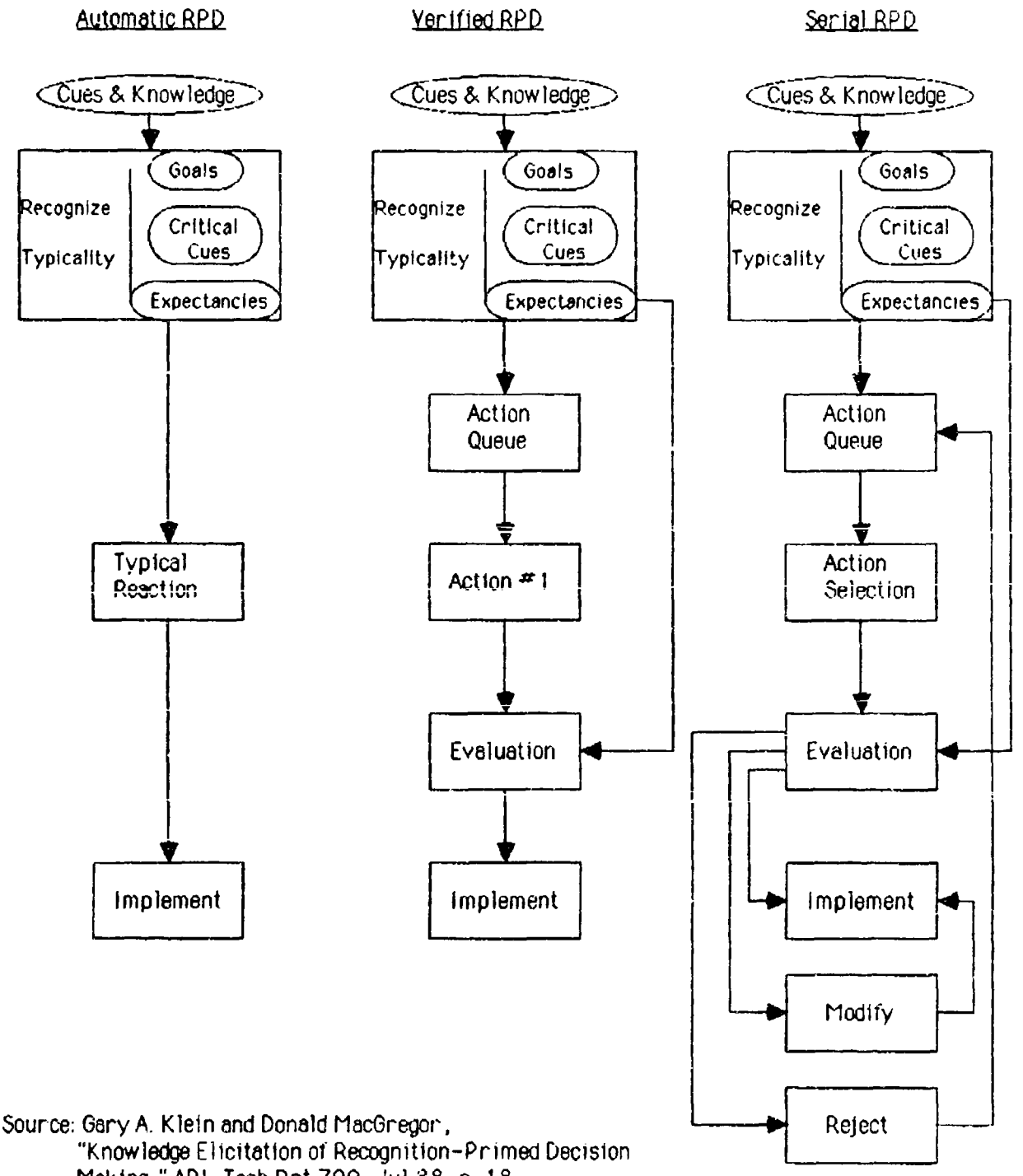
decision-making.

Appendix A: MILITARY DECISION-MAKING PROCESS



Source: FM 71-2, The Tank and Mechanized Infantry Battalion Task Force, Sep 88, p. 2-15.

Appendix B: RECOGNITION-PRIMED DECISION MODEL



Source: Gary A. Klein and Donald MacGregor, "Knowledge Elicitation of Recognition-Primed Decision Making," ARI, Tech Rpt 799, Jul 88, p. 18.

Appendix C: THE WASS DE CZEGE COMBAT POWER MODEL

Combat Power is a function of:

1. **FIREPOWER EFFECT**: (which is a function of)

VOLUME OF FIRE: (which is a function of)
- Number of delivery means
- Supply capability
- Rate of fire of weapons systems

LETHALITY OF MUNITIONS:
- Design characteristics
- Explosive energy

ACCURACY OF FIRES:
- Weapon and munition design characteristics
- Crew proficiency
- Terrain effects
- Visibility

TARGET ACQUISITION:
- Intelligence and intelligence analysis
- Location and functioning of observers and sensors
- Transmission of target data

FLEXIBILITY OF EMPLOYMENT:
- Weapons ranges
- Mobility
- Signature effects
- Fire control systems
- Tactical employment doctrine

2. **MANEUVER EFFECT**:

UNIT MOBILITY:
- Physical fitness and health of individuals
- Unit teamwork and esprit
- Unit equipment capabilities
- Unit equipment maintenance
- Unit mobility skills

TACTICAL ANALYSIS:
- Intelligence and knowledge of enemy tactics
- Understanding of terrain effects
- Understanding of own unit capabilities

MANAGEMENT OF RESOURCES:
- Equipment utilization
- Supplies utilization
- Personnel utilization
- Time utilization
- Utilization of energies of subordinates

COMAND, CONTROL, AND COMMUNICATIONS:
- Span of control
- SOP's and doctrine

Staff efficiency
Communications efficiency

3. **PROTECTION EFFECT**:

CONCEALMENT:
Camouflage
Stealth
Equipment design
Counter enemy intelligence acquisition means

EXPOSURE LIMITATION:
Minimize potential target size
Minimize potential target exposure time
Complicate potential target tracking

DAMAGE LIMITATION:
Individual protective equipment design and use
Use of natural cover
Use of artificial cover (incl field fortifications)
Combat vehicle design
Medical treatment and evacuation system
Combat equipment canibalization and repair
Alternate command and control arrangements
Providing personnel and materiel replacements
Misc. efforts to maintain continued combat effectiveness of units

4. **LEADERSHIP EFFECT**:

TECHNICAL PROFICIENCY:
Training
Experience

UNDERSTANDING OF UNIT CAPABILITIES:
Training
Experience

ANALYTICAL SKILLS:
Selection
Training
Experience

COMMUNICATION SKILLS:
Selection
Training

DEDICATION, COMMITMENT, AND MORAL FORCE:
Selection
Motivation
Training

UNDERSTANDING OF BATTLEFIELD EFFECTS:
Combat experience
Training

Appendix D: ABBREVIATED COMMAND ESTIMATE

Mission

1. Conduct Mission Analysis
2. Develop Restated Mission

Situation (Develop Course of Action [COA])

1. Draw the enemy and friendly situations on a map or overlay
2. Develop two or three possible COAs and draw them on an overlay

Analyze Courses of Action

1. War-game the courses of action
2. A synchronization matrix may be used to visualize friendly COAs in time, space, and their relationship to the enemy force

Comparison

Each COA is compared for advantages and disadvantages

Decision

1. The commander determines the best COA
2. The commander issues his guidance which consists of:

    a. Restated Mission
    b. Initial Concept of the Operation
        (1) Commander's Intent (Object, Reason, Importance)
        (2) Battlefield framework
    c. Initial Scheme of Maneuver
        (1) Movement
        (2) Objectives
        (3) Responsibilities
        (4) Formations/Dispositions
        (5) Maneuver options
    d. Time Plan and Orders Technique

3. Staff implements the commander's decision and develops branch plans

Execution

1. Gain critical information through reconnaissance
2. Execute branch plans on order

ENDNOTES

1. W. Edward Shirron, "An Optimum Method of Wargaming a Tactical and Operational Course of Action As an Integral Part of a Corps Commander's and G3's Estimate of the Situation In a Time-Compressed Environment," MMAS Thesis, US Army Command and General Staff College, 1984, p 4-5.

2. Paul S. Hilton, "Wargaming," unpublished NTC paper, 1990, p. 15

3. Shirron, "An Optimum Method...," p. 3

4. Timothy D. Lynch, "Problem-Solving Under Time Constraints: Alternatives for the Commander's Estimate," SAMS monograph, US Army Command and General Staff College, 1989-90, p 1.

5. Gary A. Klein, "Strategies of Decision Making," Military Review (May 1989), p. 59.

6. Ibid., p. 59.

7. "Abbreviated Command Estimate Process," FORSCOM Leaders Training Program document, p. 13.

8. Huba Wass de Czege, "Understanding and Developing Combat Power," unpublished paper, 10 February 1984, p. 1

9. Rex R. Michel, "Historical Development of the Estimate of the Situation," Research Report 1577, ARI, (Fort Leavenworth, KS, October 1990), pp. 1, 15.

10. Ibid., p. 3.

11. Ibid., p. 4.

12. Ibid., p. 6.

13. Ibid., p. 6.

14. Ibid., pp. 6-7.

15. US Army, Field Manual 101-5, (Washington D.C., May 1982), p. 5-1.

16. Michel, Research Report 1577, p. 7.

17. Ibid., p. 10.

18. US Army, Field Manual 101-5 (draft), (Fort Leavenworth, KS, 1977), p. 8-14.

19. Michel, Research Report 1577, p. 10, and FM 101-5 (draft), (1977), pp. 5-12 and 5-14.

20. Michel, Research Report 1577, p. 11.

21. US Army, Field Manual 101-5, Staff Organization and Operations, (Washington, D.C., May 1984), p. 5-2.

22. FM 101-5, May 1984, p. 5-2.

23. US Army, Field Manual 71-2, The Tank and Mechanized Infantry Battalion Task Force, (Washington D.C., 27 September 1988), p. 2-15.

24. Shirron, "An Optimum Method...," pp. 1,11, 21, 82.

25. FM 71-2, 27 September 1988, p. 2-11 and p. 2-18.

26. US Army Command and General Staff College, Student Text 100-9, (Fort Leavenworth, KS, July 1991), p. 4-1-4-3.

27. Ibid., p. 4-2.

28. Center for Army Lessons Learned, (Fort Leavenworth, KS), National Training Center Take-Home Packets 90-11, 90-12, 90-13, 91-2.

29. William F. Crain, "Battle Staff Operations: Synchronization of Planning at Battalion and Brigade Level," MMAS Thesis, 1989, US Army Command and General Staff College, pp. 30-31.

30. National Training Center, Orders Guide, Brigade Trainers (Fort Irwin, CA, February 1991), p. 20.

31. Michel, Research Report 1577, p. 1.

32. Jon J. Fallesen, et. al., "Analysis of Tactical Courses of Action Using Structured Procedures and Automated Aids," ARI Conference Paper, (Fort Leavenworth, KS, 11 October 1989), p. 3.

33. Thomas J. Schwartz, "A Theory and Model for the Planning of Land Combat," Master's Thesis, Naval Post Graduate School, (Monterey, CA, September 1990), p.2.

34. Rex R. Michel, "Determining the Nature of Tactical Decisionmaking Expertise," unpublished abstract, ARI, (Fort Leavenworth, KS, 1991), p. 2.

35. John F. Schmitt, "Observations on Decisionmaking in Battle," Marine Corps Gazette (March 1988), pp. 18-19.

36. Klein, "Strategies of Decision Making," pp. 58-59.

37. Lynch, "Problem-Solving...," p. 7.

38. Klein, "Strategies of Decision Making," p. 56-57.

39. Gary A. Klein and Donald MacGregor, "Knowledge Elicitation of Recognition-Primed Decision Making," Technical Report 799, ARI (Fort Leavenworth, KS, July 1988), p. 20.

40. Klein, "Strategies of Decision Making," p. 60.

41. Klein and MacGregor, "Knowledge Elicitation ..," pp. 17-19.

42. Ibid., p. 19.

43. Ibid., p. 20, and Carl von Clausewitz, On War, (Princeton, 1984), p. 102.

44. Jose A. Picart, "Expert Warfighters with Battlefield Vision," Military Review (May 1991), p. 52.

45. Rex R. Michel and Sharon L. Riedel, "Effects of Expertise and Cognitive Style on Information Use in Tactical Decision Making," Technical Report 806, ARI, (Fort Leavenworth, KS, June 1988), pp. 8-9.

46. Ibid., p. 9.

47. Marshall L. Fallwell, "The Principles of War and The Solution of Military Problems," Military Review (May 1955), p. 50.

48. Picart, "Expert Warfighters...," p. 53.

49. Klein, "Strategies of Decision Making," pp. 61-63

50. Marvin Thordsen, et. al., "A Knowledge Elicitation Study of Military Planning," Technical Report 876, ARI, (Fort Leavenworth, KS, February 1990), pp. 41-42.

51. Kevin B. Smith, "Combat Information Flow," Military Review (April 1989), p. 48.

52. Lynch, "Problem-Solving...," p. 15.

53. Wass de Czege, "Understanding and Developing Combat Power," p. 9.

54. Ibid., p. 14.

55. Ibid., p. 1.

56. US Army, Field Manual 100-5, Operations, (Washington, D.C., 5 May 1986), p. 11.

57. Wass de Czege, "Understanding and Developing Combat Power," pp. 9-10.

58. Wass de Czege, "Understanding and Developing Combat Power," pp. 16-26.

59. Ibid., p. 10.

60. Shirron, "An Optimum Method ..," p. 54.

61. Wass de Czege, "Understanding and Developing Combat Power," p. 14.

62. Timothy L. McMahon, "Decisionmaking In Modern War," Military Review (October 1986), pp. 36-37.

63. NTC, Orders Guide, pp. 20-22.

64. See NTC Orders Guide, appendix E, for additional information regarding graphic-matrix orders.

65. NTC, FORSCOM Leaders Training Program, "Abbreviated Command Estimate Process,"p. 13.

66. Wass de Czege, "Understanding and Developing Combat Power," p. 26

67. Ibid., p. 14.

68. US Army, FM 101-5 (draft) (1977), as quoted in Michel, "Historical Development of the Estimate of the Situation," p. 16.

69. Michel, "Determining the Nature of Tactical...," p. 3.

70. Shirron, "An Optimum Method...," p. 82.

71. Michel, "Historical Development of the Estimate of the Situation," p. 15.

72. Wass de Czege, "Understanding and Developing Combat Power," p. 1-2.

73. John Keegan, The Face of Battle, (New York, 1976), p. 20.

74. Thordsen, et. al., "A Knowledge Elicitation...," p. 50.

75. Klein, "Strategies of Decision Making," p. 64.

BIBLIOGRAPHY

Books

Keegan, John. The Face of Battle. New York, NY: Penguin Books, 1976.

Manuals

Brigade Trainers, Orders Guide. Fort Irwin, CA. NTC, February, 1991.

Field Manual 71-2, The Tank and Mechanized Infantry Battalion Task Force. Washington, DC: HQ, Department of the Army, September 1988.

Field Manual 100-5, Operations. Washington, DC: HQ, Department of the Army, 5 May 1986.

Field Manual 101-5 (unpublished draft). Staff Officer's Field Manual, Staff Organization and Procedure. 1977.

Field Manual 101-5, Staff Organization and Operations. Washington, DC: HQ, Department of the Army, May 1982.

Field Manual 101-5, Staff Organization and Operations. Washington, DC: HQ, Department of the Army, May 1984.

Student Text 100-9, Techniques and Procedures for Tactical Decision-making. Fort Leavenworth, KS: US Army Command and General Staff College, July 1991.

Articles

Beach, Johnston, and Scott, Brad D. "Expanding the Limits of Combat Decision Making." Military Review, Vol LXIX, April 1989, No. 4.

Bolger, Daniel P. "Command or Control?" Military Review, Vol LXX, July 1990, No. 7.

Fallwell, Marshall L. "The Principles of War and the Solution of Military Problems." Military Review, Vol XXXV, May 1955, No. 2.

Hall, Wayne M. "Learning to Focus Combat Power." Military Review, Vol LXVIII, March 1988, No. 3.

Klein, Gary A. "Strategies of Decision Making." Military Review, Vol LXIX, May 1989, No. 5.

Marvin, F. Freeman. "Using History In Military Decision Making." Military Review, Vol LXVIII, June 1988, No. 6.

McMahon, Timothy L. "Decisionmaking In Modern War." Military Review Vol LXVI, October 1986, No. 10.

Picart, Jose A. "Expert Warfighters with Battlefield Vision." Military Review, Vol LXXI, May 1991, No. 5.

Schmitt, John F. "Observations on Decisionmaking in Battle." Marine Corps Gazette, Vol 72, March 1988, No. 3.

Smith, Kevin B. "Combat Information Flow." Military Review, Vol LXIX, April 1989, No. 4.

Teston, Harvey A., Jr. "Command and Confusion at the NTC." Military Review, Vol LXV, November 1985, No 11

Wilkes Lowell L., Jr. "Putting Military Analysis Back Together." Military Review, Vol XXXV, April 1955, No. 1.

Reports and Memoranda

Fallesen, Jon J. "Problems in Command and Control (C2)." Memorandum for Dir, CTAC, USACGSC, from Army Research Institute (PERI-SL), 1 May 1989.

Fallesen, Jon J., et. al. "Analysis of Tactical Courses of Action Using Structured Procedures and Automated Aids." Army Research Institute conference paper, October 11, 1989

Klein, Gary A., and MacGregor, Donald. "Knowledge Elicitation of Recognition-Primed Decision Making." Army Research Institute Technical Report 799, July 1988.

Michel, Rex R. "Historical Development of the Estimate of the Situation." Army Research Institute Research Report 1577, October 1990.

Michel, Rex R., and Riedel, Sharon L. "Effects of Expertise and Cognitive Style on Information Use in Tactical Decision Making." Army Research Institute Technical Report 806, June 1988.

Thordsen, Marvin, et. al. "A Knowledge Elicitation Study of Military Planning" Army Research Institute Technical Report 876, February 1990.

Monographs and Theses

Crain, William F. "Battle Staff Operations: Synchronization of Planning at Battalion and Brigade Level." MMAS Thesis, US Army Command and General Staff College, 1989.

Long, Clyde L. "Synchronization of Combat Power at the Task Force Level: Defining a Planning Methodology." MMAS Thesis, Fort Leavenworth, KS, 1989.

Lynch, Timothy D. "Problem-Solving Under Time-Constraints: Alternatives for the Command Estimate." Monograph, School of Advanced Military Studies, US Army Command and General Staff College, First Term, Academic Year 1989-1990.

Schwartz, Thomas Joseph "A Theory and Model for the Planning of Land Combat." Master's Thesis, Naval Post-graduate School, Monterey, CA, September 1990.

Shirron, W. Edward "An Optimum Method of Wargaming a Tactical and Operational Course of Action As an Integral Part of a Corps Commander's and G3's Estimate of the Situation In a Time-Compressed Environment." MMAS Thesis, US Army Command and General Staff College, 1984.

Unpublished Material

Center for Army Lessons Learned. NTC Take-Home Packets 90-10, 90-11, 90-12, 90-13, 91-1, 91-2. CALL, Fort Leavenworth, KS.

FORSCOM Leaders Training Program. "Abbreviated Command Estimate Process." Operations Group, National Training Center, Fort Irwin, CA.

Hilton, Paul S. "Wargaming." NTC Observer-Controller observations, 1990.

Michel, Rex, R. "Determining the Nature of Tactical Decisionmaking Exertise." Army Research Institute unpublished abstract, 1991.

Wass de Czege, Huba. "Understanding and Developing Combat Power" unpublished paper, 10 February 1984.